

Claims:

1. A method in stereo widening or corresponding spatial  
signal processing of stereo format signals to become suitable for  
5 headphone listening, which method comprises at least the steps of  
forming left and right channel signal paths in order to  
process left and right channel input signals into left and right channel  
output signals, and  
forming at least one delay introducing a cross-talk signal  
10 path between the left and right channel signal paths,  
wherein the method further comprises the step of forming a separate  
monophonic signal path in order to equalize a frequency spectrum of a  
monophonic component of the left and right channel output signals by  
at least  
15 extracting from the left and right channel input signals an  
at least substantially monophonic signal component contained in said  
signals,  
processing the monophonic signal component to obtain a  
processed monophonic signal component, and  
20 combining said processed monophonic signal component  
with at least one of the left and the right channel output signals.
2. The method according to claim 1, wherein the at least  
substantially monophonic signal component is extracted from the left  
25 and right input signals based on a momentary average value  $(L+R)/2$  of  
said signals.
3. The method according to claim 1, wherein the at least  
substantially monophonic signal component is extracted from the left  
30 and right channel input signals based on similarity between said  
signals.
4. The method according to claim 1, wherein the processing  
of the monophonic signal component includes processing of a  
35 frequency spectrum of said monophonic signal component.
5. The method according to claim 4, wherein the processing  
of the frequency spectrum of said monophonic signal component is

performed substantially within a frequency range ranging from 500 Hz to 2 kHz.

5           6.     The method according to claim 1, wherein the processing of the monophonic signal component includes adjustment of the gain of said monophonic signal component.

10           7.     The method according to claim 6, wherein the adjustment of the gain is performed in a time varying manner.

          8.     The method according to claim 1, wherein the processing of the monophonic signal component includes adding a delay to said monophonic signal component.

15           9.     A signal processing device for stereo widening or corresponding spatial signal processing of stereo format signals to become suitable for headphone listening, the device comprising at least

20                 left and right channel signal paths in order to process the left and right channel input signals into left and right channel output signals, and

                  at least one delay introducing a cross-talk signal path between the left and right channel signal paths, wherein the device further comprises a separate monophonic signal path in order to equalize a frequency spectrum of a monophonic component of the left and right channel output signals, said monophonic signal path comprising at least

25                         means for extracting from the left and right channel input signals an at least substantially monophonic signal component contained in said signals,

30                         means for processing the monophonic signal component to obtain a processed monophonic signal component, and

                  means for combining said processed monophonic signal component with at least one of the left or the right channel output signals.

35           10.    The device according to claim 9, wherein the means for extracting the at least substantially monophonic signal component from

the left and right channel input signals are based on determining a momentary average value  $(L+R)/2$  of said signals.

5        11.    The device according to claim 9, wherein the means for extracting the at least substantially monophonic signal component from the left and right channel input signals are based on similarity between said signals.

10       12.    The device according to claim 9, wherein the means for processing the monophonic signal component include means for processing of a frequency spectrum of said monophonic signal component.

15       13.    The device according to claim 12, wherein the means for processing the frequency spectrum of said signal component comprise a digital Infinite Impulse Response (IIR) or a Finite Impulse Response (FIR) filter structure.

20       14.    The device according to claim 12, wherein the processing of the frequency spectrum of said monophonic signal component is performed substantially within a frequency range ranging from 500 Hz to 2 kHz.

25       15.    The device according to claim 9, wherein the means for processing the monophonic signal component include means for adjusting the gain of said monophonic signal component.

30       16.    The device according to claim 15, wherein the means for adjusting the gain are arranged to perform the adjustment in a time varying manner.

35       17.    The device according to claim 9, wherein the means for processing the monophonic signal component include means for adding a delay to said monophonic signal component.

18.    The device according to claim 9, wherein the device is a digital signal processing device.

19. A computer program in stereo widening or corresponding spatial signal processing of stereo format signals to process said signals to become suitable for headphone listening, said program comprising machine executable steps arranged to carry out at least the  
5 steps of

forming left and right channel signal paths in order to process left and right channel input signals into left and right channel output signals,

10 forming at least one delay introducing a cross-talk signal path between the left and right channel signal paths, and further

forming a separate monophonic signal path in order to equalize a frequency spectrum of a monophonic component of the left and right channel output signals by at least

15 extracting from the left and right channel input signals an at least substantially monophonic signal component contained in said signals, and

processing the monophonic signal component to obtain a processed monophonic signal component, and further

20 combining said processed monophonic signal component with at least one of the left and the right channel output signals.

20. A computer program according to claim 19, wherein it is arranged to be executed in a digital signal processor.

21. A mobile appliance with audio capabilities comprising at  
25 least signal processing means for stereo widening or corresponding spatial signal processing of stereo format signals to become suitable for headphone listening, said signal processing means comprising at least

30 left and right channel signal paths in order to process the left and right channel input signals into left and right channel output signals, and

at least one delay introducing a cross-talk signal path between the left and right channel signal paths,  
wherein the signal processing means further comprise a separate  
35 monophonic signal path in order to equalize a frequency spectrum of a monophonic component of the left and right channel output signals, said monophonic signal path comprising at least

means for extracting from the left and right channel input signals an at least substantially monophonic signal component contained in said signals,

5 means for processing the monophonic signal component to obtain a processed monophonic signal component, and

means for combining said processed monophonic signal component with at least one of the left or the right channel output signals.

10 22. A mobile appliance according to claim 21, wherein it is a portable digital player or a digital mobile telecommunication device.